

Coral Red Doubleswords

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Here I have summarized eight years of doublesword breeding, resulting in a strain of coral red or bluegreen doublesword guppies which were bred in the base colours of grey, albino and blond (American gold). A few years ago they could have simply been called coral red albino doubleswords, but I will explain the history from the beginning.

I received my first doubleswords in 1997 from Olof Boberg from Sweden. The strain was Viennese emerald which originated directly from Robert Kratochwil from Vienna. The strain was of very good shape. For many years Robert Kratochwil has been a top breeder of the Viennese Emeralds, which is the most true-breeding doublesword strain available. I was not new to breeding guppies at the time, since I had bred pet shop guppies and later triangle tail, show guppies in small scale for years. The vitality and beauty of the Kratochwil doubleswords made me discard my triangle strains within months and I still have not kept any triangles other than for the occasional outcrossings described here.

At the Swedish Guppy Club's show in Stockholm in April 1998, Ömer Gulmez from Germany showed a trio of coral red albino doubleswords. These males got rather low points because they were small and had small and almost uncoloured dorsal fins. They were, however, a new variant and caught the eye of both the general public and my fellow Swedish guppy hobbyists. The males were extremely lively and vital and had a striking orange body colour (the coral red in albino version) and red, rather short swords. In Europe it is not common to return the fish to the owner after a show, therefore the fish were the club's property to give away to members or to be auctioned out.

We were three members of the guppy club that agreed to share the trio and get one each, while many of the winning trios attracted little interest. My chosen male was the only one of the three to have a tiny little red spot in the dorsal. It also had an extra fin ray sticking out between the swords, glowing orange. According to later communication with Ömer, the fish was a result of a cross he had made between coral red doublesword males from Hans Luckmann from Germany, and red albino triangle females originating from Ed Richmond from the United States.

I bred the male with two young virgin Viennese Emerald females (base colour grey). The choice of Viennese Emerald was not well planned, it just happened to be the DS strain I had at hand at that time, although it was not a bad solution as a first step. The two females got one small drop of just nine fry each within a month and I did not take any more fry from them. The F1 generation of course had a base colour of grey and the males were coral red doubleswords with fair shape. They had coloured yellow dorsal and had a blue-green spot at the caudal peduncle.

I bred four males to thirteen sisters in one breeding group (September 1998). Since the males were young and all quite uniform, there was no reason to use only a single male at this stage. In F2 the albino share was about 25% at birth, but albinos were lacking in some

litters because some grey females selectively cannibalize albino fry. All grey fry were discarded from the F2 drops. The adult F2-males were all Albino Coral Red doubleswords, but of two different colours variants. Albino Coral Red could be changed to albino coral red because I do not capitalise these words in the rest of the article... not an important detail.

The variant I chose to continue with had the X-linked yellow dorsal and the blue-green colours from the Viennese emerald strain. The other type had a colourless dorsal fin and few other colours than the orange from the original male, furthermore, they had less good shape. I never used the second type for breeding, but the strain still sometimes produces some males with colourless dorsal fins.

The shape in F2 was not as nice as the original Viennese Emeralds, but it was easily improved by selection for a few generations. See pictures 1 and 4 for males of this type. With F2-fish I used some albino males and females for an all albino breeding group. Another group of females was back-crossed to the two best grey males from the F1-generation. These two males were clearly better than the brothers when they were older.

The multicolour coral red albino doubleswords (picture 1) received good results at European shows during the years 1999-2001. They were bred and shown from other breeders and probably still are. However, my goal was to produce more full red doubleswords and as no red doubleswords existed at the time, especially no strains with a fair red dorsal, I chose to test-cross to three red triangle strains to try to get the red dorsal into my strain (1999). I knew that the Y-chromosome of my strain carried the coral red trait and some other traits for red, so I was especially looking for an X-linked red dorsal fin.



Picture 1. Multi-coloured albino DS males from F3-F4 after the original albino DS x Viennese Emerald cross. From the year 2000. (above right)

The first cross was to a half-black red triangle male from Bo Samuelsson from Sweden. All F1-males became trianglerails and carried the red dorsal, thus I guessed that the red dorsal gene was Y-linked and I discarded all fish from that cross. There was no reason to continue against bad odds. The second cross (to a blond red triangle male from Bo Samuelsson) resulted in F1-males that all were trianglerails and carried a dull greyish dorsal. Thus I guessed that the red dorsal was X-linked and I used the F1-females in a back-cross to my multi-coloured DS albino males.

The back-cross confirmed that these females carried the X-linked red dorsal fin, but it was also linked to triangle tail at this X-chromosome. These F1-females carried a yellow dorsal

and DS at their other X-chromosome (originally from a Viennese Emerald strain). Therefore, I got two varieties of male offspring: 50% double swordtails with yellow dorsal and 50% "triangle tails" (mostly bad shapes) with the red dorsal. The only odd one of about 100 males was a triangle male with yellow dorsal!

So I probably got a cross-over that joined the two unwanted characters. This cross never gave what I wanted, so I discarded all fish from the strain, including some interesting triangle males (Picture 2).



Picture 2. Nice males of a type I did not want. They were discarded from the breeding program.

Finally, a cross to a red blond male from Boguslaw Micinski from Krakow, Poland, gave some unexpected and nice results. The male (mated to albino DS females) gave red double swordtails already in F1 (Picture 3). The F1 males were of bad DS shape with weak red body colour (lacking the Y-linked coral red from the DS strain) and they all carried a red dorsal. I kept the best of these males despite that I knew that the red dorsal was probably Y-linked. I back-crossed the F1-males to my albino DS-females and still got badly shaped red DS males with somewhat weak body colour and red dorsal colour. The F1-males were of course 100% grey but the back-crossed F2 were 50% albino (Picture 3).

Picture 3. One F1-male of the Micinski blond triangle x albino DS female cross. The second fish is an F2-female (not the original individual but a similar fish). She got the gene for the red dorsal fin as X-linked, thanks to a cross over event. The third fish is one of the F3 males. He was one of the first fish that combined coral red, double sword and the red dorsal fin, in addition, he was one of three males shown at the Stockholm show in 2001 as the first shown fish of this variant.



Picture 4. Females of the type carrying X-linked red dorsal fins and swords. They are F3 after the Micinski cross (i.e. back-crossed two times to the DS-strain). The male is a better multi-coloured albino DS male used for a further back-cross to increase the shape of the full red albino doubleswords. (below)



The red dorsal fin of all F2-males confirmed that the red dorsal was Y-linked. More interesting was that also one albino F2-female had a coloured dorsal and red upper and lower caudal fin edges. Double swordtail females from my strain always had clear fins before, so I suspected this got some colour genes from the father. I mated this female with the albino coral red DS males (second back cross). The results were 50 % almost full red coral red albino DS males with somewhat better shape (Picture 5).

These males now carried the originally Y-linked red dorsal as X-linked. Clearly, the red dorsal was now linked to double swordtail in these fish and this was a result of one single cross over. The variant had, and still has, shape problems compared to the original Viennese emeralds or to the multi-coloured coral reds, but this can be improved by continuous selection of the best fish. Another persisting problem in the strain is to keep the intensity of the red colour. Few fish today are as good in colour as the male in picture 3. Shape of the dorsal fin was a problem that has now improved a great deal.



Picture 5. Red albino doubleswords, 2003.

The red albinos somewhat improved in shape and size by selective breeding; picture 5 shows some males from year 2003. By this time, as a side project, I had introduced the gene "Asian blue", also called base colour blue 2 or r2, into the strain.

Annett Wolf from Sweden had experimented with the gene, by crossing a neon blue triangle male, into her strain of Japan blue DS. From her F2 back-cross (to DS) I received a female that carried the gene in heterozygous form (r2R2). This female crossed with a red male of the type from picture 3 (bottom) gave the very badly shaped F1-son shown in picture 6. This badly shaped male was of course also heterozygous for Asian blue (r2R2), but he carried coral red and other Y-linked genes for red.

The results confirmed that the Asian blue inhibits the red in one way or another, replacing it with blue or green, just as it does in blue grass and blue neon triangle strains. The details of how this works are not known. What we know is that it works and the trait is dominant in this respect (and recessive when it comes to "base colour").



Picture 6. Top. F1 male after a red DS albino male and DS female (r2R2) with Asian blue gene. Middle. F2 male after the top male backcrossed to a red DS albino female. Bottom. F3 male after a sister to the middle male backcrossed to a red DS albino male. These three males were heterozygous for Asian blue (r2R2).

This F1-male was back-crossed to a red albino female and produced the albino male in picture 6 (middle). This male theoretically had both X and Y chromosomes from the red DS-strain and all their genes for red (and Asian blue, r2R2). As seen in picture 6, he still had terrible shape. The male also had very little red colour, but interestingly, the red stripe on the body was not red, but instead was black on the base colour grey of the father (Picture 6, top).

Because the shape was still so bad, I did not use the male or his equally bad brothers for the next backcross, but instead used his sisters with better shaped full red DS males. This gave the fish in picture 6 (bottom). He does not display very good shape, but it was a clear improvement. After this I did one or two further backcrosses to the red fish and now regard the variants as one strain. The r2 gene was (almost) always kept in heterozygous form, and therefore, I got 50% red fish in each generation, ever since the F1-cross. To avoid the homozygous, sword less and relatively colourless Asian blue fish (e.g. r2r2, Picture 7), I

usually breed bluegreen males ($r2R2$) to red females ($R2R2$) or red males ($R2R2$) to bluegreen females ($r2R2$). The $r2R2$ females can be identified because they lack the red colour.



Picture 7. A blond $r2r2$ male. The male is a year old and it should be obvious why I do not like the variant and why the bluegreen DS Asian blue males shown at many shows in Europe (2004-2005) have not been $r2r2$ males, but heterozygous $r2R2$ fish.

Parallel to the development of the bluegreen variant, I also introduced base colour blond (American gold) into the strain. This was done based on a blond red male from Hans Rillnert from Sweden. Also, I decided to keep the base colour grey in the strain. The introduction of blond was slightly more time consuming because it takes two generations for a cross to recessive base colour and I backcrossed two times as not to lose too much of the shape. Thus it took six generations to introduce blond (2002 until recently) and I now breed albino, blond and grey as one strain.

The three base colours come as either red or bluegreen, thus I have six variants (Picture 8). The different base colours make the breeding more interesting if breeding only one strain. In addition, I am still not sure that the fertility of albinos is comparable to grey and blond, therefore, it is also safer to breed these base colours. Of course, the strain can be kept in one or two base colours; it can be kept as only red, but not as only bluegreen due to the Asian blue genetics.



Picture 8. The six variants of the strain. Top row are red fish, bottom row are bluegreen fish. From left to right: base colour grey, blond and albino.

I am grateful to all the generous people that I received the founding fish from. From my efforts, the strain has now been fairly well spread (other than the blond variant). Daniel Schröder from Germany has shown the albino and grey red DS in Europe. Enrique Patino has spread the same variants in USA. Benny Trustrup was the first to show the bluegreen albino DS in 2004 with good results. He has also shown the bluegreen grey variant. Günter Kother got the albino variants, via Benny (bluegreen) and Daniel (red), and has shown both red and bluegreen albinos with excellent results in 2005.

I am well aware of that the strain still has some problems, but it can all be improved in the hands of good breeders and I hope the strain will continue to attract interest. A typical problem is that relatively few males have an acceptable shape (especially the dorsal and tail fin). Also, the intensity of the red is hard to maintain and without selection for colour intensity, the red tend to become diluted. For that reason I prefer to use red males to bluegreen females. I then have a better chance to select the most intensely coloured males.

I also struggle to keep the strain as genetically variable as possible at my limited circumstances. That way the strain can give different and interesting fish, as for example, the recent male shown in picture 9. The male has some flaws but also good qualities he has been used for breeding (as one of a number of males in that generation).



Picture 9. Recent albino red DS male with good shape and colour intensity. The green spot in the tail base is a flaw.



Picture 10. Left: grey red and blue males. Right: blond: red and blue males. The two bottom fish are genetically r2R2 just like all bluegreen fish pictured in this article with the exception of the homozygous r2r2 blond (bb) fish in picture 7. The bluegreen (r2R2) fish are sometimes more blue, like the bottom males here, and sometimes more green like the grey and blond fish in picture 8. I care more about the intensity of the red fish (R2R2) and less about if the r2R2-fish are blue or green. It is just a matter of taste.

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